

1 **WHAT IS CLAIMED IS:**

2 1. A method of resetting to zero azimuth automatically comprising the
3 steps of:

4 collecting multiple samples with different azimuths in the longitudinal
5 and latitudinal orientations using two orthogonal magnetic sensors, and
6 outputting corresponding first and second sine wave signals (Sx) (Sy);

7 adjusting the amplitudes of one of the first and second sine wave signals
8 (Sx) (Sy) such that the amplitudes of the first sine wave signals (Sx) and the
9 amplitudes of the second sine wave signal (Sy) are equal;

10 comparing the sample values in each set respectively represented by the
11 first and second sine wave signals (Sx) (Sy) to generate the maximum and
12 minimum values (Xmax, Xmin) (Ymax, Ymin);

13 computing the average values (Xbase, Ybase) basing on the maximum
14 and minimum values (Xmax, Xmin) (Ymax, Ymin), and taking the average
15 values (Xbase, Ybase) as the reference first and second sine wave signals (RSx,
16 RSy) having reset to zero azimuth, whereby

17 the reference first and second sine wave signals (RSx) (RSy) have the
18 positive and negative sides of equal amplitude.

19 2. The method of resetting to zero azimuth as claimed in claim 1, wherein
20 the first and second sine wave signals (Sx) (Sy) from the two magnetic sensors
21 are 90 degrees out of phase with each other.

22 3. The method of resetting to zero azimuth as claimed in claim 1, wherein
23 the method further comprises the steps of:

24 comparing the maximum value (Xmax) of the first sine wave signals and

1 the maximum value (Y_{max}) of the second sine wave signals to yield a
2 differential ratio $R1 = X_{mas}/Y_{max}$; and
3 multiplying the second sine wave signals (S_y) by the differential ratio $R1$
4 such that the amplitudes of the first and second sine wave signals (S_x , S_y)
5 become equal.

6 4. The method of resetting to zero azimuth as claimed in claim 1, wherein
7 the method further comprises the steps of:

8 comparing the maximum value (X_{max}) of the first sine wave signals and
9 the maximum value (Y_{max}) of the second sine wave signal to yield a differential
10 ratio $R2 = Y_{mas}/X_{max}$; and

11 multiplying the first sine wave signals (S_x) by the differential ratio $R2$
12 such that the amplitudes of the first and second sine wave signals (S_x , S_y)
13 become equal.

14 5. A method of measuring the azimuth after having reset to zero azimuth,
15 comprising the steps of:

16 taking multiple samples respectively using two orthogonal magnetic
17 sensors, and outputting corresponding first and second magnetic induction
18 signals (I_x , I_y);

19 multiplying the second magnetic induction signals (I_y) by the ratio $R1$;
20 and

21 comparing amplitudes of the first magnetic induction signals (I_x) with an
22 adjusted amplitude of the reference first sine wave signals (RS_x), and comparing
23 amplitudes of the second magnetic induction signals (I_y) with an adjusted
24 amplitude of the reference second sine wave signals (RS_y), in order to generate

1 the azimuth.

2 6. The method of measuring the azimuth as claimed in claim 5, wherein
3 the method of measuring the azimuth further comprising the steps of:

4 taking multiple samples respectively using two orthogonal magnetic
5 sensors, and outputting corresponding first and second magnetic induction
6 signals (I_x , I_y);

7 multiplying the first magnetic induction signals (I_x) by the ratio R_2 ; and

8 comparing the amplitudes of the first magnetic induction signals (I_x)

9 with the adjusted amplitude of the reference first sine wave signals (RS_x), and

10 comparing the amplitudes of the second magnetic induction signals (I_y) with the

11 adjusted amplitude of the reference second sine wave signals (RS_y), in order to

12 generate the azimuth.